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PATENT APPLICATION 10/710,469 AMENDMENT

FOR GROUP ART UNIT: 3641
EXAMINER: STEPHEN JOHNSON

PATENT APPLICATION AMENDMENT

Application Number: 10/710,469 Title: Improvements to Electromagnetic Propulsion Devices

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To: The Honorable Commissioner of Patents:

Attention Group Art Unit: 3641

Dear Sirs:

Please accept the following 15 modifications to the specification of the above indicated patent application.

1) Replacement of paragraph **0046** with corrected paragraph **0046** below in which corrections are indicated in the manner dictated by CPR 1.121 and are grammatical in nature.

Paragraph 0046

The device has two barrel rails, that are power rails. The power rails are of like or similar length, located in the barrel cavity wall along the same length of barrel, parallel the cavity central axis, and proximal and electrically insulated from each other and each power rail has a continuous surface its length that is part of the barrel cavity surface and which extends the length of the barrel through which the device propels an armature. Each power rail [[~~and~~]] has a connection means at its breach end for attachment of circuitry to an outside power source.

The barrel walls also contain a wall conductor assembly; *i.e.* wall assembly. The wall assembly includes a barrel bus that is located in the barrel wall and parallel to, of similar length and barrel cavity length location as the power rails. The barrel bus is in close proximity one of the power rails and electrically insulated from both power rails. The wall assembly also includes a plurality of equal length parallel wall conductors in the barrel cavity wall which are separated from each other in a distribution along the length of the barrel bus and located at or very near the barrel cavity surface and each wall

conductor is physically and electrically continuous with and perpendicular to the barrel bus. Each wall conductor extends from the barrel bus circumscribing, within the barrel cavity wall, most of the cavity to close proximity without contact with the barrel power rail distal the barrel bus. At said power rail proximal location each wall conductor has and is electrically continuous with an electrical contact means at the barrel cavity. Beyond the barrel bus each wall conductor is electrically insulated from its surrounding except at its electrical contact means when an armature current shunt surface is at the barrel cavity location of said means.

End paragraph 0046

2) Replacement of paragraph **0050** with corrected paragraph **0050** below in which the correction is indicated in the manner dictated by CPR 1.121 and is a redundancy error of paragraph 0048.

Paragraph 0050

~~The armature also has an aft current shunt located on the breach side of the armature propulsion bus and with the armature in the barrel cavity the aft shunt is located proximal the barrel power rail without electrical continuity the forward current shunt and the aft current shunt has surface in the armature surface proximal the cavity wall and said shunt via said shunt surface has continuous electrical continuity with the wall conductor assembly via the assembly aft wall conductor contact means and during armature movement in the barrel cavity said continuous electrical continuity is sliding and said continuous sliding electrical continuity is extant as said aft wall conductor contact means are passing across said shunt surface. During barrel cavity traverse by the armature, said aft current shunt, via said surface, has continuous sliding electrical continuity with the wall conductor assembly and said continuity is resultant the continuous sequential sliding electrical continuity said aft current shunt surface has with successive wall conductors, via their contact means, comprising aft wall conductor of the wall conductor assembly as said contact means pass across the aft shunt surface with continuous sliding electrical continuity as the aft current shunt passes said contact means barrel cavity location.~~

The invention has a propulsion bus-aft shunt circuit means that is either a short current bus in the armature that has physical and electrical continuity with both the aft current shunt and the proximal end of the armature propulsion bus, or a third barrel rail of like length, parallel to, and extending through the same barrel length as the power rails and which also has a continuous barrel cavity surface its length. When the propulsion bus-aft shunt circuit means includes a third barrel rail, and an armature is in the barrel cavity, continuous electrical continuity is maintained between the armature's propulsion

bus and aft current shunt by the third rail via the continuous electrical continuity its barrel cavity surface has with aft current shunt surface and surface at the proximal end of the propulsion bus.

End paragraph 50

3) Replacement of paragraph **0054** with corrected paragraph **0054** below in which correction is indicated in the manner dictated by CPR 1.121 and is grammatical in nature.

Paragraph 54

With reference now to the present inventions, when the propulsion bus-aft shunt circuit means is a short current bus in the armature between the aft current shunt and the end of the propulsion bus proximal said shunt, the magnetic fields of the barrel power rails interact with the bus current creating forces therein with components orthogonal the barrel cavity axis. When armature current bus is oriented parallel to the armature axis and when in the barrel cavity located in the barrel cavity midway between the barrel power rails, said orthogonal force components collectively resolve into a tangential force about the armature axis at the current bus center line radius. Said tangential force is always directed towards the power rail at the forward current shunt and away from the power rail at the armature propulsion bus. This force might therefore be used to aid armature rotation during traverse of the barrel cavity, rotation which is otherwise effected by the barrel cavity surface. When the propulsion bus-aft shunt circuit means for a barrel cavity traversing armature is comprised of a third barrel rail that has continuous sliding continuity with both the aft current shunt and the armature propulsion bus said tangential force on the armature is eliminated.

End paragraph 54

4) Replacement of paragraph 0061 with corrected paragraph **0061** below in which correction is indicated in the manner dictated by CPR 1.121 and is a deletion of misleading material.

Paragraph 0061

The armatures and barrel for the devices are made of electrically non-conducting materials such as SiC or high strength proprietary plastics. The wall conductor assembly and barrel rails are made of good conducting material such as copper, aluminum or iron alloys. ~~The insulating ceramic or plastic materials comprising the barrel and armature structures might be replaced by conducting materials as long as effective electrical insulation is used to isolate the conducting elements of the invention from those intended to be non-conducting.~~

End Paragraph 0061

5) Replacement of paragraph 0065 with corrected paragraph **0065** below in which corrections are indicated in the manner dictated by CPR 1.121 and is grammatical in nature.

Paragraph 0065

Indication of a coil's current direction and/or winding direction ~~are~~ is herein always indicated, unless otherwise noted, ~~indicated~~ when looking from the muzzle end towards the breach end of the coil or part in which the coil is mounted and indicated as cw for clockwise current circulation or direction the coil winding about the coil axis and ccw for counter clockwise current circulation and coil winding about the coil axis.

End paragraph 0065

6) Replacement of paragraph 0074 with corrected paragraph 0074 below in which corrections are indicated in the manner dictated by CPR 1.121 and inserts a missing word

Paragraph 74

Barrel Bus and Rail Length and Location: Assembly lengths and locations along the barrel cavity length of barrel rails might vary slightly from one another in a design; *i.e.* the two power rails extant in embodiments of the invention, along with the barrel rail of the propulsion bus-aft shunt circuit means when extant, and the barrel bus of the wall conductor assembly might have slight variations in length and location along the barrel cavity length. Therefore, the spacial and length relationships between the barrel rails herein are described using the terms 'like' or 'similar' include these minor variations. Examples follow. The power rail with forward current shunt continuity might be shortened at the breach or displace in the muzzle direction by the distance between the breach proximal edges of the forward and aft current shunts. The power rail with propulsion bus continuity might be shortened or displace towards the muzzle the distance between the breach proximal edges of the armature propulsion bus at said continuity and aft current shunt. The barrel rail of the propulsion bus-aft shunt circuit, when extant might be shortened at the muzzle by the distance between the muzzle proximal edges of the forward current shunt and propulsion bus continuity with said rail. The barrel bus length and location along the barrel cavity length might vary slightly, from proximal barrel rails; therefore, 'like' or 'similar' is used to reference the length and location of the wall conductor assembly barrel bus to barrel rail. The barrel bus should extend the length of the barrel and its length might be trimmed at the breach by the distance between the breach proximal edge of the aft current shunt and the breach proximal end of an armature and its length might be trimmed at the muzzle by the distance between the muzzle edge of an

armature forward current shunt and the muzzle end of said armature..

End 0074

7) Replacement of paragraph 0084 with corrected paragraph 0084 below in which corrections are indicated in the manner dictated by CPR 1.121 and inserts a missing words and deletes nonessential words.

Paragraph 84

Propulsion Bus: A propulsion bus is a continuous conductor oriented orthogonal to the armature axis between its to ends. The propulsion bus is in the armature, at, or in close proximity the armature surface that is proximal the barrel cavity wall surface when in the barrel cavity. When the propulsion bus is a conventionally wound coil, each turn, is very slightly skewed to a right section plane. *e.g.* In a very tightly wound coil, when a right section plane of the armature is coincident with the muzzle side of conductor (insulation) at the beginning of a turn it is coincident with the breach side of the conductor (insulation) at the end of the turn and the conductor turn while circumscribing the armature axis passes completely through said plane. When in the barrel cavity, the ~~The~~ propulsion bus has at one end continuous electrical continuity with a barrel power rail and with armature movement said continuity is sliding. At its other end, the armature propulsion bus has continuous electrical continuity with the propulsion bus-aft shunt circuit means, ~~or a second barrel power rail also with continuous electrical continuity which is sliding with armature movement.~~ The magnetic fields of the forward and aft wall conductor currents interact with the propulsion bus current causing armature propulsion in the barrel cavity.

End paragraph 0084

8)Replacement of paragraph 0089 with corrected paragraph 0089 below in which corrections are indicated in the manner dictated by CPR 1.121 and replaces an incorrect word combination with a word "constant" and its subscript "barrel".

Paragraph 0089

In right sections profiles of the barrel cavity with twist, the angular displacement of increment area elements at their fixed radii about the cavity axis of the barrel rails and the various elements of the wall conductor assembly, or elements of said rails and assembly, at, in or through the cavity surface, taken with reference a cavity right section at their end or boundary closest the breach increases with distance towards the muzzle from the reference section at constant rate: ~~constant barrel.~~ $\underline{\text{constant}_{\text{barrel}}}$.

End paragraph 0089

9) Replacement of paragraph 0090 with corrected paragraph 0090 below in which corrections are indicated in the manner dictated by CPR 1.121 and replaces an incorrect letter "Li" combination with the letter with subscript "L_i".

Paragraph 0090

In an armature used in a barrel with twist, profiles of consecutive right sections taken at equal increments from breach end to muzzle end have increasing angular displacement about the armature axis at a constant rate;

i.e. $(\theta_i - \theta_0) / (L_i - L_0) = \text{constant}_{\text{armature}} = \text{constant}_{\text{barrel}}$ where θ_0 and L_0 are angle and distance, respectively, at the armature breach end and both are 0. Angle θ_i is the collective angular displacement the armature profile at distance ~~Li~~ L_i from the armature breach end.

End paragraph 0090

10) Replacement of paragraph 0093 with corrected paragraph 0093 below in which corrections are indicated in the manner dictated by CPR 1.121 and removes unessential words "and its".

Paragraph 0093

Wall Conductor Coil: An wall conductor coil functions as a wall conductor and is a continuous insulated conductor located in the barrel cavity wall at, in or proximal the barrel cavity wall surface except where contoured to pass across a barrel rail with isolation therefrom. Each turn of a wall conductor coil completely circumscribes the barrel cavity. The conductor coil as a wall conductor has a central axis (about which it was wound) that with the coil in the barrel cavity wall is close and parallel or coincident to the barrel cavity axis. The wall conductor coil is comprised of one or more turns circumscribing the barrel cavity ~~and its~~ with each turn in or proximal the barrel cavity surface.

End paragraph 93

11) Replacement of paragraph 0105 with corrected paragraph 0105 below in which corrections are indicated in the manner dictated by CPR 1.121 with "a" replaced by "'a' " and "m" replaced by "'m'" "r" replaced with " 'r' " and word "radius" replaced by "radii.

Paragraph 0105

The current path in figure 1 with the power rail 130 attached to the positive terminal of an outside power supply and power rail 127 attached to the return terminal of said power is indicated by letters a 'a' through ~~m~~ 'm' and the magnetic fields H resultant current in forward and aft wall conductor

through the armature propulsion bus 141 are indicated at their ~~radius~~ radii r 'r'.

End paragraph 105

12) Replacement of paragraph 0106 with corrected paragraph 0106 below in which corrections are indicated in the manner dictated by CPR 1.121 with "b" replaced by "'b' ".

Paragraph 0106

The current path from 'a' to 'b' is in the muzzle direction via the barrel power rail 130 and at b 'b' the path is from power rail 130 to forward current shunt 134 via the rail cavity surface 129 continuity with surface 136 of the forward current shunt 134, the current path continues in the forward shunt 134 from 'b' to 'c' at the electrical continuity of contact means of 119 of forward wall conductor 118 with forward current shunt surface 135.

End paragraph 0106

13) Replacement of paragraph 0118 with corrected paragraph 0118 below in which corrections are indicated in the manner dictated by CPR 1.1.21 with "extant" replaced by "extent".

Paragraph 0118

With reference to the above force equation, the magnetic field of the current element I r $d\theta$ at the intersection of an axis plane with a conducting wall conductor acts at distance d in the axis plane deflected angle α to an cavity axis parallel ray through said current element in the axis plane and the magnetic field acts on an equal current element I in the intersection of said plane with a turn of the armature propulsion bus coil. If the propulsion bus coil is wound in the conventional manner the values of distance, d, and cos α between the wall conductor current element at an axis plane and a propulsion bus coil turn current element at the intersection of said axis plane vary from one coil turn to the next and vary in each coil turn with incremental displacement of said axis plane through the arc θ ~~extant~~ **extent** of the wall conductor.

End paragraph 0118

14) Replacement of paragraph 0122 with corrected paragraph 0122 below in which corrections are indicated in the manner dictated by CPR 1.1.21 with surface 221i inserted.

Paragraph 0122

Figure 3 is a view at a 15° angle up into the muzzle of accelerator 200. Barrel bus 217 of wall conductor assembly 216 is shown sectioned and a wall conductor 218 is shown in its barrel cavity orthogonal extension from the barrel bus 217 circumscribing most of the barrel cavity 233 at the outer

surface 220e of barrel cavity shell 220 and terminating in the barrel rail subassembly 225 whereat its contact means 219 extends to the barrel cavity through mating opening 221 in the cavity surface 225i continuation of cavity shell 220 surface 220i in the rail subassembly 225. Shown are the plurality of wall conductor 218 contact means 219 in their respective openings 221 through barrel cavity 233 surface 225i of the rail subassembly 225. The barrel power rail 227, its cavity surface 226 with the its open guide way channel 226c its length along with barrel power rail 230, its cavity surface 229 with its open guide way channel 229c its length are indicated in their rail subassembly mounting 225. Also shown in figure three are armature guide ways 203 and 203a that extend the length of the barrel cavity 233 in its shell 220 for location and traverse therein of armature guides 247 and 247a.

End paragraph 0122

15) Replacement of paragraph 0122 with corrected paragraph 0122 below in which corrections are indicated in the manner dictated by CPR 1.1.21 with indicated number ~~300~~ replaced with 230 .

Paragraph 0125

Figure 5 is a view of an armature 232 for the propulsion device 200. The armature forward current shunt 234 and its surfaces 235 and 236 are indicated and forward current shunt 234 surface 236 is at armature guide 205 whereat it supplants the guide surface. The armature aft current shunt 237 with it surfaces 238 in the armature surface is shown along with the electrically insulating encasement 241c of armature propulsion bus 241. Surface 242 of the propulsion coil 241 is shown supplanting armature guide 207 surface. Armature guide 247a is also shown. With an armature 232 mounted for propulsion through the barrel cavity 233, partition guide 205 is in mating channel 229c in the barrel cavity surface 229 of power rail ~~300~~ 230, armature guide 207 is in mating channel 226c in the barrel cavity surface 226 of power rail 227, and partition guides 247 and 247a are in barrel cavity guide ways, 203 and 203a, respectively.

End paragraph 0125

Thank you for your attention.

Respectfully

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